FIG. **4** is a perspective view of another embodiment of a sensor having a keyboard graphic disposed onto a substrate, a sensor plane sensing the position of a user's finger, and a force sensor determining key selection by the user;

FIG. **5** is a perspective view of an embodiment of a user contact surface having a keyboard graphic disposed onto a substrate composed of a compliant material and having a texture capable of being felt by a human finger;

FIG. **6** is a cross-sectional view of another embodiment of a sensor having a contact surface substrate composed of a compliant material and a plurality of at-a-distance capacitive sensors;

FIG. **7** is a cross-sectional view of another embodiment of a sensor having a compliant contact surface, a sensor plane determining the position of the user's finger, and a contact detection sensor sensing selection of one of the keys by the user;

FIG. **8** is a flow diagram of another embodiment of a system for inputting data to an electronic system according to the invention;

FIG. **9** shows the variable angular orientation of a finger-shaped cursor;

FIGS. **10**A and **10**B show a method for toggling between two input modes in an electronic system;

FIG. **11** shows a perspective view of an embodiment of a finger-mounted virtual input device having tuned inductive coils;

FIG. **12** shows a schematic diagram of one embodiment of a base transceiver for use with the input device of FIG. **11**; and

FIG. **13** shows a finger-mounted virtual input device implemented with magnetotransistors.

DETAILED DESCRIPTION OF THE INVENTION

In brief overview, and referring to FIG. **1**, an embodiment of an apparatus **10** for inputting data to an electronic system includes a sensor **12**, a processor **14**, and a head-mounted display **16**. In one embodiment, the electronic system is a computer system. In another embodiment the electronic system is a CD ROM access system. The sensor **12** senses the position of the user **18** in real space. As used herein, "real space" is defined as the real world environment. In one embodiment, the sensor **12** senses the continuous position of the user **18** in real space. In another embodiment, the sensor **12** senses the position of a user's finger in real space in two dimensions. In another embodiment, the sensor **12** senses the position of the user's finger in three dimensions. In yet another embodiment, the sensor **12** also senses the orientation of the user's finger in real space. In still another embodiment, the sensor **12** simultaneously senses the position of each of a plurality of the user's fingers in real space. While embodiments of the sensor **12** for sensing the position of a user's finger will be described in detail below in the discussion of FIGS. **3** through **7** and **10**A through **13**, it is possible for embodiments of the sensor **12** to sense the position of other parts of the user's body.

In one embodiment, the sensor **12** includes a position sensor and a selection sensor. The position sensor senses the position of the user's finger in at least two dimensions (XY) and reports this XY position data to the processor **14** where it is used to drive a cursor that mimics finger motion on the head-mounted display **16**. The selection sensor senses when the user selects one of the plurality of input options to be input to the electronic system and reports this selection information to the processor **14**.

The processor **14** is in communication with the sensor **12** and receives a signal from the sensor **12** indicating the position of the user **18** in real space. The processor **14** may be in wired or wireless communication with the sensor **12**. The processor **14** executes an algorithm to enable the user **18** to input data to an electronic system. The algorithm includes an input device module **20**, a user position module **22**, and an input option selection module **24**. The input device module **20** generates a representation of an input device in virtual space. As used herein, "virtual space" is defined as the processor-generated virtual environment with which the user **18** can interact. The representation of the input device includes a plurality of input options which the user **18** may select As used herein, "input options" are defined as the data the user may select to input into the electronic system or the functions which the user may select the electronic system to perform. In one embodiment, the representation of the input device is a representation of a traditional alphanumeric keyboard. In this embodiment, the plurality of input options includes the keys of the keyboard which may be selected by the user **18**. In another embodiment, the input device module **20** may also generate a set of "pull-down" menus from which the user may select a function. In one embodiment, the processor **14** is a computer processor and the algorithm is implemented through software.

The user position module **22** determines the position of the user **18** in virtual space relative to the representation of the input device generated by the input device module **20**. The user position module **22** utilizes the information obtained by the sensor **12** to determine the position of the user **18** in virtual space. In an embodiment in which the sensor **12** senses the continuous position of the user **18** in real space, the position module **22** determines the continuous position of the user **18** in virtual space. In an embodiment in which the sensor **12** senses the position of the user's finger, the position module **22** determines the position of the user's finger in virtual space relative to the representation of the input device. In an embodiment in which the sensor **12** senses the position of a plurality of user fingers, the position module **22** determines the position of each of the plurality of user's fingers in virtual space relative to the representation of the input device generated by the input device module **20**.

The input option selection module **24** determines when the user **18** selects one of the plurality of input options of the representation of the input device and also determines which of the plurality of input options the user **18** selects. The input option selection module **24** utilizes the information obtained by the sensor **12** regarding the position of the user **18** and information from the user position module **22** regarding the position of the user **18** in virtual space relative to the representation of the input device to determine when an input option is selected by the user **18** and which input option is selected. One method by which the input option selection module **24** makes these determinations is discussed in detail below in the description of FIG. **8**.

There are several ways to implement wireless communication between the sensor **12** and the processor **14**. One method is to modulate the electric field of the body of the user **18** (body LAN). This method reduces the cost of the system through the elimination of a dedicated keyboard receiver. Within this category are several techniques. Transmitted data may include absolute or relative XY location data, or specific key location as determined by known sensing technologies. A novel sensing technology is to incorporate the body LAN as a finger location identification means. This is accomplished by providing a number of discrete transmitter points (electrodes) at or below the